

SHEAR ATTACHMENT

1 Your Petitioner, WARREN D. GREGORY, JR., a citizen of the United States and
a resident of the State of Iowa, whose post office address is P.O. Box 342, Sidney,
Iowa 51652-0342, prays that Letters Patent may be granted to him for the invention set
5 forth in the following specification.

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

The present invention relates to mechanical attachments for front-end loaders
and other motorized vehicles. More particularly, the present invention relates to a shear
10 attachment having gripping teeth disposed along a receiving jaw to grip the object being
cut by a cutting edge of the shear.

2. DESCRIPTION OF THE PRIOR ART

Shears can be provided in a variety of configurations to cut objects having
15 different shapes and sizes. Two of the most common types of shears are one- and
two-bladed shears, which have upper and lower jaws that are pivotably coupled to one
another so that the jaws move in a scissor-like motion. Anyone who has used these
types of shears knows that one serious drawback to the design of pivoting shears is
that dense or hardened objects are easily pushed out of the jaws of the shears as the
20 user engages the jaws in a closing or cutting direction. A simple example of this
phenomenon occurs when a pair of scissors is used to cut a wooden dowel. As the
jaws are closed and the cutting pressure is increased, the dowel simply slides to the
forward end of the blades until it is ejected from the scissors, uncut.

Several shear attachments have been developed over the years for use with wheeled vehicles, such as skid loaders, tractors and the like. These shear attachments typically take the form of either a one or two bladed pivoting shear. Accordingly, the same shortcomings experienced by the pair of scissors in cutting the dowel are experienced by a shear attachment being used to delimb or fell a tree. For example, United States Patent No. 4,541,177 discloses a single bladed, pivoting shear attachment for delimbing trees. The shear receives tree branches between a cutting jaw and an anvil receiving frame. Unfortunately, as the cutting jaw engages large tree limbs, it oftentimes pushes the limbs along the anvil frame, rather than cutting them, causing the shear and the motorized vehicle to be pushed away from the tree until the limbs are simply pushed out of the jaws of the shear attachment. Those limbs that are not pushed completely out of the jaws are pushed to the forward end portion of the shear, where the cutting power of the shear is weakest, oftentimes leaving the limbs only partially sheared. To counteract these forces, the operator must set the brakes of the vehicle or engage its drive system to push the vehicle toward the tree as the shear pushes the vehicle away from the tree, of course, such efforts tend to put strain on the vehicle and decrease in their level of effectiveness as the vehicle's traction decreases. Moreover, the jaws of the shear attachment are fixed in a vertical orientation, rendering the shear nearly useless to the user who needs to fell a tree or section a felled tree, rather than delimb it.

Other, more complicated, prior art shears have been designed to include hydraulically operated clamping systems that are coupled to the motorized vehicle,

adjacent the shear attachment. Such devices are typically operated by first grasping
the tree with the clamping system. The user then operates the shear to remove a
portion of the tree. Such systems are complex to manufacture and use, which
increases the cost of the device and the likelihood of component failure. Moreover, as
the operator engages the shear in a cutting motion, the clamping system attempts to
overcome the forces caused by the shear. This causes an undesirable tension
between the two structures, which can result in a system failure or serious injury to the
operator.

Accordingly, what is needed is a shear attachment for use with motorized
vehicles that is easily adapted for cutting materials in a plurality of different angles.
More importantly, a simple but effective grasping system is needed to help stabilize the
shear with respect to the object being cut while the shear is engaged.

SUMMARY OF THE INVENTION

The shear attachment of the present invention is preferably used in combination
with front-end loaders and other motorized vehicles. The shear is comprised of an
upper cutting jaw and a lower receiving jaw. The upper and lower jaws are pivotally
connected to each other at their rearward end portions. The shear is rotatably coupled
to a mounting bracket, which is removably coupled to the vehicle. In a preferred
embodiment, a plurality of teeth extend upwardly from the upper edge of the lower
receiving jaw to grip an object while it is being cut between the upper and lower jaws. A
single actuator is provided to move the cutting jaw between open and closed positions.

1 The shear is coupled to the mounting bracket so that it may be selectively pivoted about
an axis extending generally perpendicular from the mounting bracket.

5 In operation, the shear of the present invention can be used to cut various
objects, comprised of different types of materials, that may be disposed in nearly any
position. The shear is particularly well suited for felling, sizing and pruning trees and
other brush. The gripping teeth of the lower jaw secure the shear and the object being
cut in a stationary position with respect to one another while the object is cut in nearly
any angular relationship with respect to the vehicle. Accordingly, available power is
directed toward cutting, rather than maintaining the shear and the vehicle in a fixed
10 position with respect to the object being cut.

The shear is preferably manufactured from high-strength plate steel, for strength
and durability. However, the simple geometry and construction of the shear make it
relatively inexpensive and easy to manufacture. A universal hitch is preferably
15 incorporated to make the shear versatile for quick and easy assembly on a plurality of
different vehicle types.

It is therefore a principal object of the invention to provide an improved shear
attachment that can be used with different types of motorized vehicles to simply and
effectively secure and cut a wide variety of objects.

20 A further object of the invention is to provide an improved shear attachment that
is capable of grasping and cutting objects simultaneously using a single actuator.

Still another object of the invention is to provide an improved shear attachment
having an upper cutting jaw, a lower receiving jaw and a plurality of gripping teeth to

1 safely keep the shear and the object being cut in a fixed position with respect to one
another.

5 Yet another object of the invention is to provide an improved shear attachment
capable of cutting objects disposed in differed positions and angles with respect to the
operating surface.

A further object of the invention is to provide an improved shear attachment that
is simple in design and construction.

10 These and other objects of the present invention will be apparent to those skilled
in the art.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of one embodiment of the shear attachment of the
present invention as the same could be used with a front-end loader;

15 Figure 2 is an isometric view of the shear attachment of Figure 1 in a generally
vertical or "delimbing" position;

Figure 3 is an isometric view of the shear attachment of Figure 1 in a generally
horizontal or "felling" position;

20 Figure 4 is a side elevation view of one embodiment of the shear attachment of
the present invention as it first receives an object to be cut; and

25 Figure 5 is a side elevation view of the shear attachment of Figure 4
demonstrating one manner in which the object can be secured by the jaws of the shear
attachment while it is being cut.

DESCRIPTION OF THE PREFERRED EMBODIMENT

1 The numeral 10 refers generally to the shear attachment of the present
invention, as the same is generally depicted in Figures 1-5. It will be apparent to those
skilled in the art that the shear attachment 10 of the present invention is well suited for
a plurality of tasks including the felling, sizing and pruning of timber, brush and other
5 vegetation. However it should also be apparent that other non-organic material, such
as scrap metal, plastic and the like could be cut using the present invention. It should
also be understood that the shear is easily adapted for use as an attachment for a
plurality of motorized vehicles, including front-end loaders, skid loaders, tractors,
backhoes, excavators and end loaders. However, the examples described herein
10 should not be considered to be limiting, as the uses and applications of the present
invention are limited only by the imagination of the user. For simplicity of description,
the shear attachment of the present invention will be described as it could be used on
skid loaders to fell or prune timber and brush.

15 As shown in Figures 1-5, the shear attachment 10 is generally comprised of an
elongated upper jaw 12 and a generally angular lower jaw 14, each having rearward
and forward end portions. "Upper" and "lower" are used herein to generally differentiate
the jaws 12 and 14 and facilitate the ease of describing the shear attachment 10 only.
Due to the variable positioning of the shear attachment 10, "upper" and "lower" are not
20 to be construed as definitive descriptions of the orientation of the jaws 12 and 14 with
respect to the horizontal. Upper jaw 12 is shaped to have a cutting edge 16 along its
lower side portion. In a preferred embodiment, the lower jaw 14 is comprised of a pair
of jaw plates 18 and 20 that are positioned in a spaced relationship with one another to
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1 form a receiver for the cutting edge 16 of upper jaw 12. The upper and lower jaws are
pivotably connected to each other at the rearward ends thereof. While it is
contemplated that many pivoting joints known in the art could be used, one preferred
assembly comprises a high strength sleeve and shaft assembly 22, which is operatively
coupled to the rearward end portions of the upper and lower jaws 12 and 14.

5 A single actuator 24 can be used to move the upper jaw 12 between open and
closed positions with respect to the lower jaw 14, as depicted in Figures 4 and 5. A first
end 26 of the actuator 24 is pivotably connected to the forward end portion 28 of the
upper jaw 12. The second end 30 of the actuator 24 is operatively connected to a
10 rearward end portion 32 of the lower jaw 14. The actuator is operatively coupled to the
vehicle 34 and the operational controls thereof. Although a plurality of actuators could
be used, one actuator provides the shear of the present invention with sufficient cutting
force for the contemplated uses of the shear attachment 10.

15 In a preferred embodiment, at least one tooth 36 is provided to extend generally
upwardly from the upper edge portion of the lower jaw 14. The tooth 36 should be
positioned with respect to the forward and rearward end portions of the lower jaw 14 so
that an object disposed between the upper jaw 12 and the lower jaw 14 will become at
least partially engaged by the tooth 36 as the upper jaw 12 is moved toward its closed
20 position. It is preferred that a plurality of spaced teeth be provided along the upper
edge portion of the lower jaw 14 to enhance the gripping ability of the shear attachment
10 along a greater length of the lower jaw 14. As depicted within the figures, it is
preferred that the teeth 36 be shaped to have engagement points for at least partially

1 piercing or deforming the object to be cut, such as a tree limb. Preferably, the teeth 36
are positioned to face generally upwardly and rearwardly from the lower jaw
14(Jorgensen-Style Configuration). This arrangement generally enhances the ability of
the teeth 36 to engage and secure the object between the upper jaw 12 and the lower
5 jaw 14. It is contemplated that the teeth 36 can be arranged to extend generally
upwardly from either or both sides of the lower jaw 14. It is further contemplated that
the teeth 36 could be integrally formed with the lower jaw 14 or seperatly manufactured
and secured thereto.

10 The shear attachment 10 is easily attached to a plurality of different motorized
vehicles, including front-end loaders, skid loaders, tractors, backhoes, excavators or
end loaders, by means of a mounting bracket 38. In order to attach the shear
attachment 10 to different vehicles, it is preferred that the mounting bracket 38 be
comprised of a universal two-pin, quick-attach hitch. However, it is contemplated that
15 other mounting assemblies would appropriately secure the shear attachment 10 to the
vehicle 34. Such mounting bracket assemblies typically operate with one or more
actuators on the vehicle 34 to pitch the mounting bracket 38 up and down with respect
to the operating surface.

20 In a preferred embodiment, the rearward end portion of the lower jaw 14 is
coupled to the mounting bracket 38 so that it may be selectively rotated about an axis
extending generally perpendicularly from the mounting bracket 38. In this manner, the
shear can be rotated so that it may be operated in a generally horizontal position, as
depicted in Figure 3, or a generally vertical position, as generally depicted in Figure 2.

1 It is contemplated that the shear can be pivoted to nearly any degree of rotation to
accommodate the circumstances presented in a cutting operation. At least one
actuator 40 couples the rearward end portion of the lower jaw 14 to the mounting
bracket 38 to assist the operator in rotation of the shear.

5 The central components of the shear attachment 10, such as the upper and
lower jaws 12 and 14, can be manufactured from numerous materials that are durable
and have sufficient strength for the contemplated uses. One preferred embodiment of
the shear attachment 10 is constructed from high-strength steel, such as ASTM-A-572
10 Grade 50 High Tensile Plate, or its approximate equivalent. The plate steel provides
benefits beyond that of strength. The plate steel provides ease of manufacture. The
upper and lower jaws 12 and 14, mounting brackets and bracing members can all be
cut from a single plate of steel, without the need of further processing and manufacture.
Accordingly, the total cost of manufacture can be decreased. Moreover, the plate steel
15 permits the cutting edge 16 of the upper jaw to be easily formed through flame cutting
or similar process and then ground to provide an optimum cutting edge. In the event
the cutting edge is blemished during future use, it can be easily sharpened on location
with a simple hand grinder.

20 In operation the shear attachment 10 of the present invention can be used to cut
irregularly shaped objects comprised of a wide range of materials. The shear 10 is
particularly well suited for felling, sizing and pruning trees and brush. For example, the
operator can position the lower shear attachment 10 closely adjacent limb of a tree at
nearly any angle and at various heights above ground. As the upper and lower jaws 12

1 and 14, the gripping teeth substantially prevent the shear attachment 10 and the vehicle
34 from being pushed away from the tree as the limb is severed by the cutting edge 16.
Accordingly, the available power of the system is directed at cutting and not wasted on
maintaining the position of the shear attachment 10 and the vehicle 34 with respect to
5 the tree. This can be particularly helpful when the ground is wet, muddy or icy.

In the drawings and in the specification, there have been set forth preferred
embodiments of the invention and although specific items are employed, these are
used in a generic and descriptive sense only and not for purposes of limitation.
Changes in the form and proportion of parts, as well as a substitution of equivalents,
10 are contemplated as circumstances may suggest or render expedient without departing
from the spirit or scope of the invention as further defined in the following claims.

Thus it can be seen that the invention accomplishes at least all of its stated
objectives.